

REMARKS

This amendment is responsive to the non-Final Office Action of July 1, 2009. Reconsideration and allowance of claims 1-13 and 15 are requested.

The Office Action

Claims 1-14 stand rejected under 35 U.S.C. § 112, first paragraph.

Claims 1-4, 6-9, and 11 stand rejected under 35 U.S.C. § 112, second paragraphs.

Claims 1-3 and 5 stand rejected under 35 U.S.C. § 102 over allegedly admitted prior art in view of Grimson (US 5,531,520).

Claim 4 does not stand rejected on art and is understood to contain allowable subject matter once the 35 U.S.C. § 112 issues are resolved.

Claims 6, 8-10, and 12-14 stand rejected under 35 U.S.C. § 102 over allegedly admitted prior art.

Claims 7 and 11 stand rejected under 35 U.S.C. § 103 over allegedly admitted prior art.

35 U.S.C. § 112, First Paragraph

The present application is concerned with aligning a current set or stack of parallel slice images of a patient with an earlier set or stack of parallel slice images of the same region of the patient. Stacks of slice images of the same region of the patient are after taken repetitively in order to monitor the progress of a treatment or the progression of a disease or condition.

Sometimes, corresponding slice images are displayed concurrently. Other times, the corresponding slices from each stack are displayed serially to produce a ciné type display showing how the slice is changing over time. Either way, the stacks of image need to be aligned so that the corresponding slices can be compared or displayed serially. To align the two stacks of images, the present application indicates that an affine transform can be used. For example, the affine transform can shift along each of the x, y, and z-axes and/or rotate about each of the x, y, or z-axes. Once the transform is determined, rather than applying the transform to the current stack of images, which could cause image degradation due to

interpolation, the references propose applying the transform to the imaging parameters and retaking the stack of current diagnostic slice images. This necessitates two full imaging sessions to generate one set of aligned images.

Within the plane of each slice, the resolution of the images is high and the transform can be determined accurately. The problem arises in trying to align the slices. The resolution in the slice direction is relatively coarse compared to the resolution within each imaging plane. If each slice is shifted in the slice direction by a fraction of the slice, then the supposedly corresponding slices do not, in fact, correspond to the same physical portion of the patient. The relatively coarse resolution in the slice direction causes inaccuracies in that alignment.

As described in the present application, when the first stack of slice images are generated, additional reference slice images, as shown in Figure 2, are also created. That is, one or a small number of slices are generated along at least two of the anterior-posterior, right-left, and head-foot axes. Of course, other orientations of the set of reference slices can be selected.

In a subsequent imaging session, when it is desired to generate a stack of current diagnostic slice images, one first generates a set of current reference images corresponding to the reference images that were generated in the past, e.g., as near as possible to the same images as are illustrated in Figure 2. A transform, such as the affine transform discussed above, is generated which brings the corresponding earlier and current reference slice images into alignment. Once the transform is determined, it is used to adjust the imaging parameters. Once the imaging parameters have been adjusted with this transform, then the stack of current diagnostic slice images is generated which are inherently aligned with the slice images of the earlier stack of diagnostic slice images.

This technique is fully and adequately described in the present application. The claims have been amended to claim such concepts more clearly. Accordingly, it is submitted that all claims and the specification now comply with the requirements of 35 U.S.C. § 112, first paragraph.

**The Claims Distinguish Patentably
Over the Prior Art**

The paragraph which starts on page 1, line 23 of the specification provides a brief summary of the underlying references listed on page 2, lines 7-11 of the present application, copies of which were provided with the Information Disclosure Statement. Because it appears that the summary may be subject to misinterpretation, the applicant hereby withdraws the summary and refers the reader and the Examiner to the underlying source materials. It is requested that the Examiner cite directly to the source materials rather than the brief summary in future Office Actions.

Claim 1 calls for at least first and second current reference slice images which are differently oriented by a preset amount. Claim 1 also calls for the geometrical transformation to be a transform which brings these current reference slice images into agreement with at least first and second earlier slice images which are differently oriented by the same preset amount. Once this transform is determined, it is used to calculate the current imaging parameters by transforming the earlier imaging parameters with the geometrical transform. Once the current imaging parameters are calculated, they are used to make a series of current diagnostic slice images. The current slice images are in agreement in three dimensions with a series of prior diagnostic slice images. Neither the cancelled summary materials on pages 1 and 2 of the present application nor the other references of record teach or fairly suggest using sets of current and earlier reference slice images, each of which includes at least two images which are differently oriented by the same preset amount in both sets. Accordingly, it is submitted that **claim 1 and claims 2-4 and 15 dependent therefrom** distinguish patentably and unobviously over the references of record.

Claim 5 calls for at least two current reference slice images which are perpendicular to each other and for at least two earlier reference slice images which are perpendicular to each other. None of the references of record disclose or fairly suggest determining a geometrical transform used for calculating current image parameters based on such perpendicular current and reference slice images. Accordingly, it is submitted that **claim 5 and claim 7 dependent therefrom** distinguish patentably and unobviously over the references of record.

Claim 6 calls for the current and earlier reference slice images to each have non-parallel orientations relative to each other. These non-parallel oriented earlier and current reference slice images are used in calculating the geometric transform which is used to calculate the imaging parameters which are used to generate a plurality of parallel current diagnostic slice images. Neither the summary of the prior art listed on page 2 nor the prior art itself disclose the use of such non-parallel reference images for generating the transform used to calculate current imaging parameters for generating a stack of parallel slice images. Accordingly, it is submitted that **claim 6** and **claims 8 and 9 dependent therefrom** distinguish patentably and unobviously over the references of record.

Claim 10 has been amended to incorporate subject matter from allowable claim 4. Accordingly, it is submitted that **claim 10** and **claims 11-13 dependent therefrom** distinguish patentably and unobviously over the references of record.

Oath or Declaration

A new Oath or Declaration signed by the inventors is enclosed.

Specification

The last sentence of the abstract has been deleted to reduce the number of words below 150.

37 CFR§1.77(b) provides **suggested** guidelines. The applicant thanks the Examiner for the suggestion, but opts not to use the suggested section headings.

The title has been amended to be more descriptive.

Claim Objections & 35 U.S.C. § 112, Second Paragraph

The claims have been amended to address the wording issues raised by the Examiner.

Drawings

A replacement sheet 1/1 of the drawings is enclosed, in which the various boxes have been labeled.

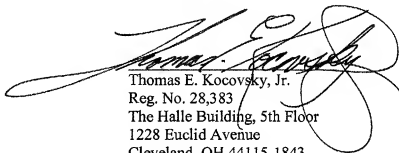
CONCLUSION

For the reasons set forth above, it is submitted that claims 1-13 and 15 comply with the statutory requirements distinguish patentably over the prior art. An early allowance of all claims is requested.

In the event the Examiner considers personal contact advantageous to the disposition of this case, the Examiner is requested to telephone Thomas Kocovsky at 216.363.9000.

Respectfully submitted,

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